REMARKS

The Applicant has filed the present Response in reply to the outstanding Official Action of November 17, 2003, and the Applicant believes the Response to be fully responsive to the Official Action for reasons set forth below in greater detail.

At the outset, prior to addressing the rejections over the prior art, the applicant calls to the Examiner's attention that Claims 1, 3, 6, 15, 17 and 20 have been amended. Amended Claim 1 recites a demodulation circuit for demodulating a digital transmission signal having improved power consumption levels and sampling frequency for a A/D converting means wherein, a known signal is insert in the digital transmission signal at transmission, the demodulation circuit comprising, inter alia, a phase shifting means for repeatedly varying a phase shift of one of the digital transmission signal and the base band signal on the basis of a comparison between a known signal after conversion (prior to P/S conversion) and the known signal inserted at transmission, wherein the improved power consumption level and sampling frequency is caused by the phase shift and the sampling frequency is lowered.

Claim 3 has been amended into an independent claim and differs from the demodulation circuit in Claim 1 only in the fact the demodulation circuit has two A/D converters for performing A/D conversion of two base band signals demodulated by the orthogonal demodulating means (demodulated phases are mutually offset for right angles) and the comparison occurs after P/S conversion such that the digital signal serial converted by said P/S converter is compared with said known signal inserted at transmission.

Claim 6 has been amended to clarify the phase shifting means and its function. Specifically, the phase shifting means modifies shifting amounts of a plurality of phase shifting elements for 1-N times (in which N is an integer greater than or equal to two) where the phase

shift equals $\Delta\theta$*n and said comparison means compares said known signal after digital conversion by said A/D converting means and said known signal inserted at transmission for each of said 1-N times and a result from said comparison means is stored in a memory means for each of said 1-N times and a second comparison means compares each of the results from said comparison means for 1-N times.

Claims 15, 17, and 20 are the corresponding method claims for Claims 1, 3, and 6, respectively.

No new matter has been added by any of the foregoing amendments to the claims. Support for the amendment of claims 1, 3, 6, 15, 17, and 20 is provided in the specification on page 5, lines 10-13, Figs. 1, 2, and 5, which disclose a demodulation circuit and method which can optimize sampling time with achieving reduction of power, a comparing portion of the circuit, prior to P/S conversion (Fig. 1) and after P/S conversion (Fig. 2) and repeatedly shifting the phase of a signal for 1-N times and then comparing the signals for 1-N times (Fig. 5).

In the outstanding Official Action, the Examiner rejected Claims 1, 9, 15 and 23 under 35 U.S.C. 102(b) and/or 102(e) as being anticipated by either Toy et al. U.S. Patent No. 5,343,498 (hereinafter "Toy") or Matsuoka et al. U.S. Patent No. 5,809,009 (hereinafter "Matsuoka"). The Examiner also rejected Claims 1-3, 5, 15-17 and 19 under 35 U.S.C. §102(e) as being anticipated by Fujii et al. U.S. Patent No. 5,991,344 (hereinafter "Fujii").

Applicant respectfully submits that all of the claims, as amended, are patentably distinct over the cited prior art references.

The claimed demodulation means, as amended, provides for a demodulation circuit and a demodulation method which can optimize sampling time and achieve ***reduction of power consumption***. This optimization is achieved by shifting either the digital transmission

signal or the converted base band signal such that the sampling frequency can be ***minimized or lowered,*** as recited in Amended Claim 1. (Emphasis added).

The proper or optimal phase shifting amount is determined by repeatedly shifting either a digital transmission signal or a converted base band signal, comparing the correlation between the converted base band signal and a known signal from a storage means, storing these correlation value(s) and comparing these correlation values, where the optimal phase shifting amount is the phase shifting value that correlates to the highest correlation value, as recited in amended Claim 6. The highest value may not be a 100% correlation. The process is repeated for 1 to N times, where the phase shifting amount is $\Delta\theta n$.

Once the optimal phase shift is determined, the process is repeated for M times, where M is greater then N, as recited in Claim 8. This repetition is done to insure that the highest correlation value has been truly detected. If a higher correlation value is detected, then that correlation value is stored in memory and either the digital transmission signal or the converted base band signal is shifted by the phase shift amount that corresponds to that correlation value, as recited in Claim 7.

None of the cited prior art references teach all of the limitations of Amended Independent Claims 1, 3, 15, and 17. Specifically, the references fail to teach or suggest that the sampling frequency should be minimized. Furthermore, the cited references do not teach or suggest the relationship between the phase shifting amount and the sampling frequency.

In fact, Toy teaches at Column 5, lines 1-5, that the best sampling time should be chosen to minimize the calculated error between a set of received reference samples and a set of estimated reference samples. This sampling frequency will most likely be higher then the

sampling frequency of the present invention, since the higher the sampling frequency would result in a lower calculation error.

Matsuoka teaches that the base band signal is supplied to a frequency offset estimation section to periodically detect an amount of an erroneous phase angle rotation between successive received signals. The frequency offset estimation section determines the error by comparing the received signal with a known value and obtains an error signal as a frequency adjustment value, indicative of the amount and direction of the frequency offset value.

This adjustment value is then supplied to the A/D conversion section to compensate for the frequency offset. See Col 10, line 64- Col 11, line 5. This is used for frame synchronization and a timing reference signal such that the center of the specific reference signal received and the known signal is correlated. The phase shifting is NOT used to determine the sampling frequency of the A/D conversion section, rather it is used to determine the starting time for the clock of the A/D conversion section.

Fujii also teaches a demodulator for demodulating a signal having a unique word inserted at transmission, detecting the unique word, storing the frequency offset of the unique word and setting as the initial value of the automatic frequency control means the frequency offset value that was stored in the storage means. Like the other two references, the phase shifting is used to synchronize the received signal with the transmission signal. The synchronization is only achieved when the complete unique word is detected and correlated. (correlation value is 100%). This means that the comparison means would continue to phase shift until the correlation value is 100%.

However, the frequency offset value compares the serial digital signal (after P/S converting) with the unique known signal. In stark contrast, Claim 1 is directed to demodulation

circuit having a phase shifting means that compares the known signal after digital conversion by said A/D converting means ***and prior to a P/S conversion*** and said known signal that was inserted at transmission.

Since none of the cited prior art references, either taken alone or in any combination thereof, teach or suggest that the sampling frequency should be minimized or the relationship between the phase shift and sampling frequency, Applicant submits that Independent Claims 1, 3. 15 and 17 are patentably distinct over the cited prior art references.

The Examiner has also rejected several of the Claims under 35 U.S.C. §103(a). Specifically, the Examiner rejected Claims 4 and 18, as being unpatentable over Fujii in view of Miya et al. (U.S. Patent No. 5,572,516) (hereinafter "Miya"); Claims 6, 9, 20, 23 as being unpatentable over Fujii in view of Nakakoshi et al JP 08-242260 (hereinafter "Nakakoshi"); Claims 7 and 21 as being unpatentable over Fujii in view of Nakakoshi and in further view of Petranovich (U.S. Patent 5,625,652); Claims 10 an 24 as being unpatentable over Fujii in view of Odenwalder et al. (U.S Patent No. 6,480,521) (hereinafter "Obenwalder") and Sawahashi et al. (U.S. Patent No. 5,694,388); Claims 10 an 24 as being unpatentable over Toy in view of Odenwalder et al. (U.S Patent No. 6,480,521) (hereinafter "Obenwalder") and Sawahashi et al. (U.S. Patent No. 5,694,388); Claims 10 an 24 as being unpatentable over Matsuoka in view of Odenwalder et al. (U.S Patent No. 6,480,521) (hereinafter "Obenwalder") and Sawahashi et al. (U.S. Patent No. 5,694,388).

With regards to all of the above noted § 103 rejections, we respectfully disagree with the Examiner's contentions based upon our above comments with respect to Fujii, Toy and Matsuoka, in view of the claim amendments. Furthermore, the additional cited prior art references do not remove any of the above-identified deficiencies of Fujii, Toy and Matsuoka,

and therefore the hypothetically combined references do not teach or suggest each and every limitation of the dependant claims.

In addition, with respect to Claims 10 and 24, Applicant respectfully disagrees with the Examiner's assertion that Obenwalder and Sawahashi teach or disclose transmitting information data on one of the I and Q channels and the known signal (pilot signals) on the other as recited in Claims 10 and 24 and traverses the rejection for at the following additionally reasoning.

At best, the hypothetically combined references teach that the pilot symbols and information data **can** be transmitted on separate channels and that a pilot signal can be transmitted on either an I or Q channel. Sawahashi states that "good tracking ability to the Raleigh fading can be achieved because the phase fluctuations in the propagation path is estimated without interruption using the pilot channel that continually transmits the pilot signal of a known pattern". See Sawahashi, col 29, lines 17-21. This only teaches that the pilot signal should be continually transmitted. Furthermore, Figure 12 does not suggest that the information data or the pilot channel is either the I or Q channels. In fact, the traffic channel (1-N) implies that there are more than two channels for transmission. Moreover, the reference does not suggest that the pilot channel should be orthogonal to the information data channel.

For all the foregoing reasons, the Applicant respectfully requests the Examiner to withdraw the rejections of independent Claims 1, 3, 15, 17, pursuant to either 35 U.S.C. § 102(b) or § 102(e). Furthermore, the Applicant respectfully requests the Examiner to withdraw rejections of dependent Claims 2, 5, 16, 19, 23 under either 35 U.S.C. § 102(b) or § 102(e) based at least on their respective dependencies, whether direct or indirect, from independent Claims 1, 3, 15, 17.

Moreover, the Applicant respectfully requests the Examiner to withdraw rejections of dependent Claims 4, 6, 7, 9, 10, 18, 20, 21, 23, 24 under 35 U.S.C. § 103(a) based at least on their respective dependencies, whether direct or indirect, from independent Claims 1, 3, 15, 17 and in view of the above analysis regarding Claims 10 and 24.

In the outstanding Official Action, the Examiner also rejected Claims 1-10, and 15-24. Claims 5 and 19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement, as the claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, to make or use the invention.

Specifically, with regards to Claim 5, the Examiner states that the limitation of "said phase shifter causes phase shift of said digital transmission signal" directly contradicts the limitation recited in Claim 1 which reads "phasing shifting means for causing phase shift of one of said digital transmission signal and said base band signal". The Examiner believes that the limitation recited in Claim 5 results in the phase shift of both the digital transmission and the base band signal.

We respectfully disagree with the Examiner's contention because, Claim 1 recites that the phase shift means causes a phase shift **of one of** said digital transmission signal and said base band signal and Claim 5 further limits this limitation to phase shifting the digital transmission signal. Accordingly, Claim 5 does not contradict the limitation of Claim 1.

The Examiner also rejected Claims 1-10 and 15-24 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

Claim 1 has been amended herewith to read, - -a known signal is inserted into said digital transmission signal at transmission- -. This amendment should clarify when the known signal is inserted into the transmission signal and provide antecedent basis for "said known signal". A corresponding amendment is also made to Claim 15. This amendment should also traverse the Examiner's rejection of Claims 2-3, and 16-17, as "said known signal" now has an antecedent basis.

In addition, with respect to Claim 3, the Examiner states that it is not clear what "the digital signal(s)" is referring to. Accordingly, the claim has been amended to read - -said phase means including a P/S converter for converting a digital signal outputted by the symbol judgment portion- -.

With regard to Claim 6, the Examiner contends that the limitation "said phase shifting means outputs different phase shifting amount for N time, (in which N is an integer greater than or equal to two) for detecting shifting amount to be shifted", is indefinite. The Examiner asserts that since the phase shifting amount has been output, it is not clear how and why the phase shifting amount output for N times may be used for the purpose of detecting the shifting amount. Accordingly, Claim 6 has been amended herewith. See Amended Claim 6. A corresponding amendment is made to Claim 20.

In conclusion, the Applicant believes that the above-identified application is in condition for allowance and henceforth respectfully solicits the Examiner to allow the application. If the Examiner believes a telephone conference might expedite the allowance of

this application, the Applicant respectfully requests that the Examiner call the undersigned, Applicant's attorney, at the following telephone number: (516) 742-4343.

Respectfully submitted,

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